

### ABSTRACT

This invention discloses a four-port loop optical circulator. The circulator includes a first, a second, a third and a fourth optical ports for receiving optical beam therein. The circulator further includes a plurality of optical components for guiding a beam received from the first port to project from the second port, for guiding a beam received from the second port to project from the third port. The optical components are further used for guiding a beam received from the third port to project from the fourth port, and for guiding a beam received from the fourth port to project from the first port. In a preferred embodiment, the plurality of optical components further include a walk-off crystal for generating a vertical optical path displacement for a vertical polarized optical beam and for passing a horizontally polarized optical beam therethrough maintaining a same optical path. In another preferred embodiment, the invention discloses a switchable optical loop circulator that includes a loop optical circulator and an optical polarization switching means disposed in an optical path of the loop circulator for switching optical transmission paths of the loop optical circulator. In a preferred embodiment, the optical switching device includes a set of latched Faraday rotators surrounded by an electromagnetic pulse means for controlling a rotation direction of the latched Faraday rotators. In a particular embodiment, the optical polarization switching means further includes electrically controlled half wave plates composed of electro-optic materials or liquid crystals. In another preferred embodiment, the optical switching device further includes an electrically controlled in/out rhomb prism or DOVE prism.